

The invention claimed is:

1. An omnidirectional two dimensional imaging apparatus comprising:

- (a) A truncated convex reflective mirror that reflects an image of substantially hemispherical scene;
- (b) An imaging sensor means positioned to receive said omnidirectional images;

whereby images with wide field-of-view of substantially hemispherical scene from a single viewpoint can be obtained.

2. An apparatus as recited in claim 1, wherein the reflective mirror is a substantially hyperbolic reflective mirror whereby the substantially hemispherical omnidirectional images with single viewing center can be obtained.

3. An omnidirectional stereo camera apparatus comprising of a pair of optically aligned omnidirectional two dimensional imaging systems as recited in claim 1 whereby the stereo omnidirectional images can be obtained.

4. An omnidirectional stereo camera apparatus comprising of a pair of optically aligned omnidirectional two dimensional imaging systems as recited in claim 2 whereby the stereo omnidirectional images can be obtained.

5. An omnidirectional three dimensional camera apparatus comprising:

- (a) An omnidirectional two dimensional imaging systems as recited in claim 1;
- (b) An omnidirectional structured light projection means;

whereby the three dimensional measurement of the surrounding objects in the omnidirectional scene can be obtained.

6. An omnidirectional three dimensional camera apparatus comprising:

- (c) An omnidirectional two dimensional imaging systems as recited in claim 2;
- (d) An omnidirectional structured light projection means;

whereby the three dimensional measurement of the surrounding objects in the omnidirectional scene can be obtained.

Patent Application Documents

[54] **Method and Apparatus for Omnidirectional Stereo Imaging**

[75] Inventor: Zheng Jason Geng, Rockville, Maryland, U.S.A.

[73] Assignee: none.

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[58] Field of Search: 348-36,38,143,147,117; 396-351,21,427;

[56] References Cited:

U.S. REFERENCES: (No patents reference this one)

US Patent Documents

4549208	Kamejima et al.	10 /1985	Picture processing apparatus
5185667	Zimmermann	2 /1993	Omniview motionless camera orientation system
5359363	Kuban et al.	10 /1994	Omniview motionless camera surveillance system
5563650	Poelstra	10 /1996	Method and device for producing panoramic images, and a method and device for consulting panoramic images
5760826	Nayar	6/1998	Omnidirectional Imaging Apparatus

Other Publications

- (1) Wood, R.W., Fish-eye view and vision under water, Philosophical Magazine, 12(Series 6):159-162,1906
- (2) Miyamoto,K, Fish-eye Lens, J. Optical Soc. America, 54(8):1060-1061,1964
- (3) Oh,S.J, and Hall,E., Guyidence of a Mobile Robot using an Omni-directional Vision Navigation System, Proc. SPIE,852:288-300, Nov.,1987
- (4) Kuban, D.P., et al, Omniview Motionless Camera Surveillance System, US Patent, No. 5,359,363, Oct. 1994
- (5) Chen,S.E., QuickTime VR – An image based approach to virtual environment navigation, Computer Graphics: Proc. Of SIGGRAPH 95, p29-38, 1995
- (6) McMillan,L, and Bishop,G., Plenoptic Modeling: An image-based rendering system, Computer Graphics: Proc. Of SIGGRAPH 95, p38-46, 1995
- (7) Zheng, J.Y., and Tsuji,S, Panoramic representation of scene for route understanding, Proc. 10 Int. Conf. Pattern Recognition, 1:161-167, 1990
- (8) Krishnan, A, and Ahuja,N., Panoramic image acquisition, Proc. Of IEEE Conf. Computer Vision and Pattern Recognition (CVPR-96), p379-384,1996